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ABSTRACT

This teaching unit, Astronomers, is one in a series of curriculum guides developed by Project CHOICE (Children Have Options in Career Education) to provide the classroom teacher with a source of career-related activities linking 5th and 6th grade elementary classroom experiences with the world of work. These seven lessons on astronomy introduce career possibilities in astronomy by reviewing basic information about astronomy and exploring how astronomers do their work, their job opportunities, their job requirements, and instruments they use. An introductory section gives the rationale for the unit, goals, performance objectives, entry-level assessment, and evaluation. A list of suggested instructional materials, such as films, filmstrips, books, community resources, and art supplies, is included in this section. Each lesson contains a statement of purpose, materials needed for the lesson, an introductory statement, class activities, and a summary activity. Written materials (such as worksheets, surveys, and task cards) are included where feasible. (MEK)

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OFFICE OF CLAUDE W. RICHARDSON
KERN COUNTY SUPERINTENDENT OF SCHOOLS

Project CHOICE
#61

A CAREER UNIT FOR GRADES 5 AND 6

ASTRONOMERS

(Science and Engineering Occupations Career Cluster)

CE

U S DEPARTMENT OF HEALTH
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

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September, 1977

FOREWORD

Project CHOICE: Children Have Options in Career Education, is an Exemplary Project from the San Diego City School District, which has been adapted, with ESEA Title IV-C funding, for Kern County Schools.

Through Project CHOICE, units have been developed to provide the classroom teacher with a source of career-related activities linking classroom experiences with the world of work. All students, regardless of their post-high school plans, share an equal need for career awareness, decision making skills, and other elements of career education. This goal can be accomplished if all teachers and counselors "fit" the appropriate units where they best apply in the curriculum.

We are indebted to the San Diego City School District, and the Project CHOICE staff, for developing and field testing the original units.

For their excellent work in re-writing the units in order to adapt them for use in Kern County Schools, we wish to recognize:

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ASTRONOMERS

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Science and Engineering Occupations Career Cluster

ASTRONOMERS

RATIONALE

Now that we are in the space age of man's development and the work of the astronomer has taken on more practical application, children have become more aware of the science of astronomy. Through this unit, the students will be introduced to a career in astronomy. They will explore how astronomers do their work, their job opportunities, job requirements, and the instruments they use.

GOALS

Through this unit, the students will:

-Learn about the instruments used by astronomers.

-Learn that measurements and calculations by early astronomers have led to the development of our time system and the calendar.

-Acquire knowledge about the different jobs of an astronomer and how astronomers work.

-Discover how the data gathered by astronomers has aided in the development of space exploration.

-Become aware of school skills needed to be an astronomer.

-Learn about the practical use of data collected by astronomers for celestial navigation.

-Become aware of some ways to check their own interest in the field of astronomy.

PERFORMANCE OBJECTIVES

By the end of this unit, the students will be able to:

-Name and describe at least two basic instruments used by astronomers.

-Tell where an astronomer does his/her work.

-Name a practical use of an astronomer's work.

-Describe in a general way the job description of an astronomer.

-State how the data collected by astronomers has made our lives better.

-Tell why someone would hire an astronomer and who that person might be.

ENTRY LEVEL ASSESSMENT
(To be used as a pre-test and a post-test.)

Use this informal inventory to determine class awareness of the job of astronomer:

1. What do we call a scientist who studies and measures objects in outer space?

2. Where does an astronomer work?

3. What kinds of instruments does he/she use?

4. What school skills would you need to have to become an astronomer?

5. How does the astronomer help to make our lives better?

6. Why would someone hire an astronomer? Who would that person be?

7. Name several different jobs astronomers do.

8. What could you do to find out if you have an interest in the field of astronomy?

EVALUATION

The final lesson has been set aside for evaluation. The Entry Level Assessment may be used as a pretest as well as a post-test, or the teacher may wish to develop his/her own. Responses may be taped or written, so that comparisons may be made in order to determine how well pupils have achieved the objectives.

SUGGESTED INSTRUCTIONAL MATERIALS

The following materials and equipment may be used in this unit:

-Films and filmstrips as listed.
-Books as listed.
-Film and filmstrip projector.
-Permission slips.
-Task cards.

Films:

Understanding Our Universe
Big Sun and Our Earth
Satellites: Stepping Stones to Space

Filmstrips:

Astronomy Through the Ages
Man Becomes an Astronomer
Telescopes: Design and Principle
Finding Out About Day and Night

Books:

The following are included in the lessons:

Number	Title	Author
520	Fun with Astronomy	Freeman
522	Telescopes and Observatories	Moore
520	The Picture History of Astronomy	Moore
523	The Stars	Ronan
920	Pioneer Astronomers	Sullivan
500 & Sci (U)	World of Science: Scientists at Work Today in Many Challenging Fields (pages 37-62)	Werner

Other related books:

520	When the Stars Come Out	Baker
523	Experiments in Sky Watching	Branley
520	Worlds in the Sky	Fenton
523.1	Stars, Men, and Atoms	Haber
509	The Universe of Galileo and Newton	Horizon
921	Galileo and the Magic Numbers	Rosen

Pamphlet:

A Career in Astronomy

Write to:

The American Astronomical Society
211 FitzRandolph Road
Princeton, New Jersey 08540

AVAILABLE IN INSTRUCTIONAL RESOURCE CENTER: OFFICE OF THE KERN COUNTY SUPERINTENDENT OF SCHOOLS
(Please preview first, to be certain of suitability for specific students and situations).

Films:	MP	4970	Exploring the Universe
	MP	612	Night Sky
	MP	1774	Planetarium, Trippensee
	MP	4944	Earth Satellites (Explorers of Outer Space)
	FS	5062	How We Learn About the Sky (old)
	FS	5921	Earth and Its Motions

COMMUNITY RESOURCES

Bakersfield College Planetarium; 1801 Panorama Drive; Bakersfield; 395-4288. Arrangements may be made through Community Services Office. Tuesdays and Thursdays are best days in 1977. (Days subject to change for following years). Two week notice (advance notice necessary if special program desired, due to paper work involved). Otherwise, when reservations are made, program will be geared to ages of children. No age limit.

Teacher Information Sheet

What Astronomy Is About - A general overview for the teacher.

Astronomers explore:

The Solar System:
What the sun, moon, and planets are made of; how they are changing; how they were formed; and how they move.

Stars:
The birth and structure of stars and what changes occur in them.

Galaxies and Cosmology:
The origin of stars, star clusters, and comets. The arrangement of stars and their motions. How the universe began and its evolution.

New Finds in Astronomy:

Quasars (1963):
Red objects that help astronomers increase their investigation of the universe to greater depths in space.

Pulsars (1967):
Rapidly rotating stars that emit pulses of light and radio waves with great regularity.

Complex Molecules:
Water, ammonia, carbon monoxide, alcohol, and elements have been identified in space.

Moon Rocks:
Pieces of the moon that were brought back by the Apollo astronauts, which give clues to the moon's age and origin.

Janus (1966):
The tenth satellite of Saturn was discovered by A. Dollfus.

Experiments in Astronomy:

Study of solar objects such as moon rocks, meteorites, solar particles, and cosmic ray particles.

Astronomers mostly work with light, x-rays, radiation and radio waves.

Light is gathered by telescopes.

Radio waves are collected with a radio telescope.

X-rays and radiation is studied with instruments carried into space by space vehicles.

Teacher Information Sheet cont.

Jobs Astronomers Do:

Observe celestial objects and make calculations to understand his/her observations.

Teaches.

Plans ways to photograph and land instruments on places like the moon, Mars, and Venus.

Tries to discover the origin of the universe and its evolution. Also studies star groupings, motions of all space objects, and their composition.

Works in industry designing spacecraft and instruments.

Works for the government with celestial navigation.

Works in planetariums where he/she teaches and gives lectures to explain the principles of astronomy.

Preparation to Become an Astronomer:

Study mathematics and physics in high school.

In college study advanced math, light, sound, electricity, magnetism, and atomic theory.

Learn a foreign language (German or French).

Be anxious to explore ideas and not easily discouraged by failure.

Most positions in astronomy require a Master's or PhD degree.

INSTRUCTIONAL STRATEGY: LESSONS 1-7

Lesson 1

PURPOSE — To introduce the children to the unit, to give the pre-test, and to plan with the students areas of interest.

MATERIALS

1. Entry Level Assessment.
2. Tape recorder and tape.
3. Task card 1.

INTRODUCTION — Say: "Today we are going to start a new unit. First, we are going to see how much we already know about this topic and later we will plan together some of the areas we will cover."

CLASS ACTIVITIES

1. Pre-test - record responses on tape or have students write them out.
2. Task card.

SUMMARY

1. On the chalkboard or on lined newsprint, chart the things the children already know about an astronomer and the things they would like to find out.
2. Have students go over task card and sign the contract.

Lesson 2

PURPOSE To introduce students to astronomy and astronomers.

MATERIALS

1. Films or filmstrips about astronomy and astronomers.* *See Suggested Instructional Materials section for suggested films and filmstrips, and for those available at Instructional Resource Center, Superintendent of Schools.
2. Film or filmstrip projector.
3. Book: World of Science, pages 37-62. Books about astronomy and astronomers (see listed books in Suggested Instructional Materials section).
4. Task cards 2 through 5.

INTRODUCTION Say: "Today we will begin learning about the fascinating field of astronomy and some of the kinds of work people do in this field. We will learn about some of their instruments and their discoveries.

CLASS ACTIVITIES

1. View film or filmstrip.
2. Students read books.
3. Assign task cards.

SUMMARY

1. Review highlights of the film or filmstrip.
2. Reports from groups using task cards.

Lesson 3

PURPOSE — To introduce students to the three main instruments used by astronomers today, the telescope, spectroscope, and radio telescope.

MATERIALS — All or part of the materials listed below may be used.

1. Film or filmstrip which explains about telescopes.* *Available at Instructional Recource Center, Superintendent of Schools: 4970 Exploring the Universe (old film, but explains telescope principles) OR Science textbook sections dealing with telescopes.
2. Film or filmstrip projector.
3. Books about telescopes (see lists in Suggested Instructional Materials section). Suggested book: The World of Science, pages 37-62.
4. Task cards 6 through 8.

INTRODUCTION — Say: "Today we are going to study the most important instruments the astronomers use in their work. They are the telescope, spectroscope, and the radio telescope."

CLASS ACTIVITIES
1. Read sections from books or have students study sections in committees.
2. Optional: View film or filmstrip.

SUMMARY
1. Review highlights of films and books.
2. Reports from groups using task cards.

Teacher Background:

Telescopes: Used to make distant objects appear nearer. There are two types, refracting telescope uses lenses and reflecting uses mirrors. Reflecting telescopes are the biggest. Usually the telescopes have cameras taking pictures which are then studied. Direct observation is done only with smaller telescopes.

Spectroscopes: Used to determine the chemical elements, temperature, and the motion of stars. The spectroscope breaks up light into color bands (like a rainbow) which are then studied.

Radio Telescopes: Picks up radio waves given off in space. They study elements, the size, and the distance of the heavenly bodies. Astronomers are learning how stars and galaxies were born. Radio astronomers can work 24 hours a day as their work is not affected by sunlight.

Lesson 4

PURPOSE To make students aware of the significance of astronomy and astronomers in their lives.

MATERIALS

1. Films, filmstrips and books about the universe. See Suggested Instructional Materials section including resources available at Instructional Resource Center, Superintendent of Schools.
2. Film or filmstrip projector.
3. Task cards 9 through 12 plus free use of other task cards.

INTRODUCTION Say: "Astronomers are important scientists who have made our lives easier through their discoveries. Because of them we know about things that we usually take for granted, such as what causes day and night, and how the sun heats our earth. Through their study astronomers and other scientists have developed our time system and the calendar."

CLASS ACTIVITIES

1. View films, and filmstrip.
2. Students read books.
3. Assign task cards.

SUMMARY

1. Discuss film highlights.
2. Reports from groups using books and task cards.

Lesson 5

PURPOSE	To have the students see where astronomers work and how they study the universe.
MATERIALS	1. Field trip arrangements: Bakersfield College Planetarium.* 2. Permission slips.
INTRODUCTION	Preview and discuss trip to the planetarium.
CLASS ACTIVITIES	1. Field trip.
SUMMARY	Discuss the things the students learned and found interesting on the trip.

*Arrangements may be made through Community Services Office - 395-4288. Tuesdays and Thursdays are best days in 1977. (days subject to change for following years). Two week notice (advance notice necessary if special program desired, due to paper work involved). Otherwise, when reservations are made, program will be planned and geared to ages of children. No age limit.

LESSON 6

PURPOSE — To introduce the students to the job opportunities, duties, and the skills needed to become an astronomer.

MATERIALS

1. Information Sheet I.
2. Task cards 13 through 16.

This is basically a discussion lesson with the background provided for the teacher.

INTRODUCTION — Say: "Today we are going to discuss the job of the astronomer. We will be discussing who employs him/her, what duties he/she might have, and what skills are needed to become an astronomer."

Teacher Background:

The topics on the information sheet are suggestions to lead a class discussion. To stimulate the discussion each topic could be presented to the class as a question, i.e. What do you think the duties of an astronomer are?

Information Sheet I.*

CLASS ACTIVITIES

1. Discussion.
2. Do task cards.

SUMMARY

1. Summarize discussion.
2. Groups using task cards give reports.

*To the teacher: You may wish to make copies of Information Sheet I for student use with task card 16.

INFORMATION SHEET I

ASTRONOMERS

Duties: Astronomers are concerned with observation of celestial bodies and activities in space. Their basic task is to take measurements of the distance, size, and motion of celestial bodies. They use a lot of math. They use direct observations and study pictures to gather information for navigation and map making. They work in observatories to study the origin of the universe. Many astronomers teach at colleges and write books. Astronomers often work with other scientists who use the information gathered by astronomers. These other scientists are oceanographers, meterologists (weather), geologists (rock), and mathematicians.

Employers: Men and women are hired as astronomers. Work for colleges where they teach, write, and do research. Private organizations like observatories and planetariums carry on research and write papers on new discoveries. Industry uses astronomers in the space field. American Telephone (ATT) uses them to place communication satellites into orbit (TELSTAR). The government uses astronomers to gather celestial information for navigation and map making, used for planes, ships, spacecraft, satellites, and missiles.

Personal Qualifications: An astronomer should have a high interest in science and math. He/she needs to be able to work and re-work the same data many times without becoming discouraged and giving up too easily.

Education: A college education and a master's degree is needed for most jobs. You will need a PhD degree to reach professional status which takes about eight years of study. Astronomers make from $18,000 to $25,000 a year. In addition to their salary, they make money on the books and articles they write, lectures and speaking engagements, and money grants to carry on special research.

Working Conditions: Usually the astronomer works in a laboratory or office, except when he/she may be using instruments. They may stay several nights at an observatory several miles from home. Sometimes they may need to travel to a distant part of the world to make observations only visible from that place.

School Skills: The most important skill is math, which is used for measuring and making calculations. Reading is used for information and reading complicated reports written by other scientists. Language skills are used to write books and reports. Hand-writing to make legible notes and reports so they can be easily read by others.

How to Get Started: Children can discover if they have an interest in the field of astronomy by joining clubs at school; make visits to observatories and planetariums; read books about astronomy and astronomers; and by building or buying a telescope.

Lesson 7

PURPOSE — To enable the students to assess their knowledge of astronomers and their work.

MATERIALS

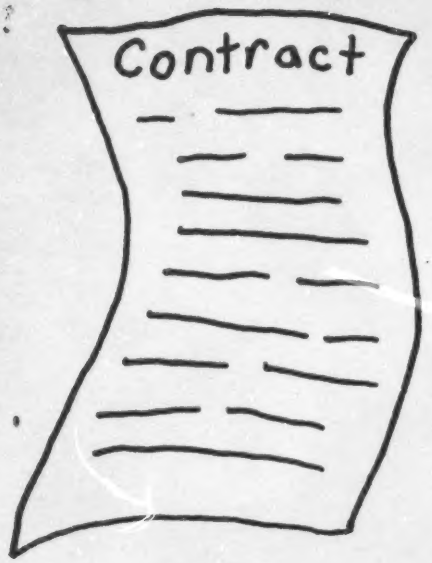
1. Tape recorder and tape.
2. Tape from pre-test.
3. Entry Level Assessment.
4. All task cards.

INTRODUCTION — Say: "Today we will find out how much we have learned about astronomers and their work. Let's listen to the tape we made before the unit began. Let's find out how much more we now know about astronomers."

CLASS ACTIVITIES

1. Listen to pre-test.
2. Make a new tape as a post-test or write the answers.
3. Free use of all task cards.

SUMMARY — Children should feel free to comment on what they have learned. They should also feel free to talk about things they've liked or disliked about certain lessons in this unit or the unit itself. They should turn in contracts signed at the beginning of the unit.



CONTRACT

You need:

1. paper
2. pencil
3. a copy of this task card

This contract when signed, represents an official and legal written document stating your effort to learn more about some field of astronomy and the astronomer whose work is involved.

I _____ will:
(Print your name)

Make an Astronomy/astronomer scrapbook.

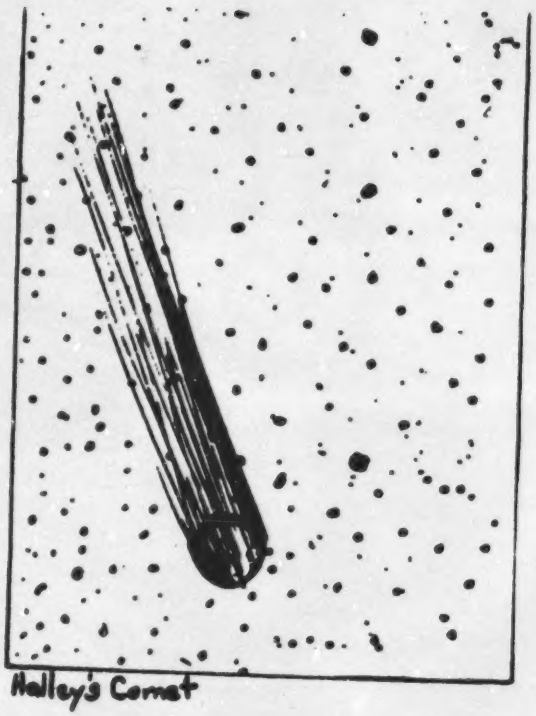
Optional:
Make a poster showing several areas of work astronomers might be involved with.

Write to the Palomar Observatory for information regarding recent discoveries and the work involved with making these discoveries.

Signed this _____ day of _____ 19___.

_____ Student Signature

_____ Teacher Signature



TASK CARD 2

MAKE A DISCOVERY

You need:

1. manila paper
2. crayons
3. book: The Stars, by Ronan
   pages 16 and 17
   or any book about astronomy, or comets
   (from your school or public library).

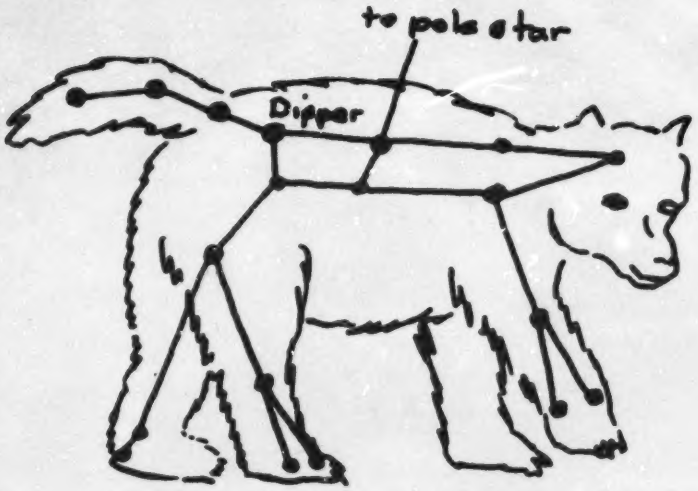
PRETEND . . . . .

You have watched the sky every night for a week looking for a new comet. Finally you see it!

Draw a picture of your comet. Give it a name - you discovered it!

Tell the class as much as you can about your comet.

TASK CARD 3



CONSTELLATIONS

You need:

1. manila paper
2. crayons
3. book: Fun with Astronomy, by Freeman
   page 49
   or any book about astronomy
   (from the school or public library).

Groups of stars were mapped by early astronomers in shapes of animals or famous heroes.

Draw a picture of the great bear constellation called the Big Dipper.

TASK CARD 4

WRITE A REPORT

You need:

1. paper
2. pencil
3. encyclopedia or book: Pioneers in Astronomy

Look up one of these astronomers.

Find out all you can about him.

Write a report for the class.

NEWTON

GALILEO

HERTZSPRUNG

COPERNICUS

BESSEL

HUBBLE

HERSCHEL

ADAMS

KEPLER

JANSKY

SMITH

LEVERRIER

HUGGINS

KIRCHOFF

SHAPLEY

FRAUNHOFER

TASK CARD 5

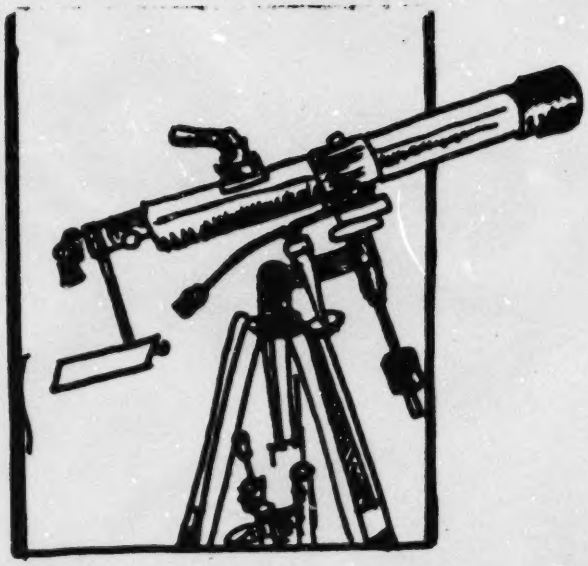
IN THE NEWS . . . . . .

You need:

1. manila paper
2. construction paper
3. scissors
4. paste
5. magazines, newspapers, etc.

We hear about different occupations in our society through comics, newspapers, television, want ads, radio, word of mouth, friends, films and various other means. Make a scrapbook about Astronomers. Include anything you can find that would make you think about a career in astronomy. Cut out the examples and paste them in a scrapbook - "How We Hear About Astronomers."

TASK CARD 6



BE A TELESCOPE DESIGNER

You need:

1. A book about telescopes (from school or public library).
2. Suggested book: Telescopes and Observatories, by Moore pages 35-37
3. manila paper
4. pencil
5. ruler

Draw your plans for a 24 inch telescope. Draw several views so you can show how each part is made.

Make a list of all the materials you will need.

Explain your plans to the class.

TASK CARD 7

RADIO-TELESCOPE

You need:

1. A book about telescopes (from school or public library).
2. Suggested book: Pioneer Astronomers, by Sullivan page 136
3. manila paper
4. pencil
5. ruler

Draw a picture of a radio-telescope showing how the radio waves are picked up. Tell one or more things you can learn from a radio-telescope.

TASK CARD 8

BE AN ASTRONOMER

You need:

1. manila paper
2. crayons or felt pens
3. pencil
4. paper

PRETEND . . . . .

You work at an observatory using telescopes. Draw a picture of yourself at work. Or show what you see through your telescope while viewing the night sky.

Write a paragraph to tell about the work you do. You may want to read about astronomers before you draw and write.

OR

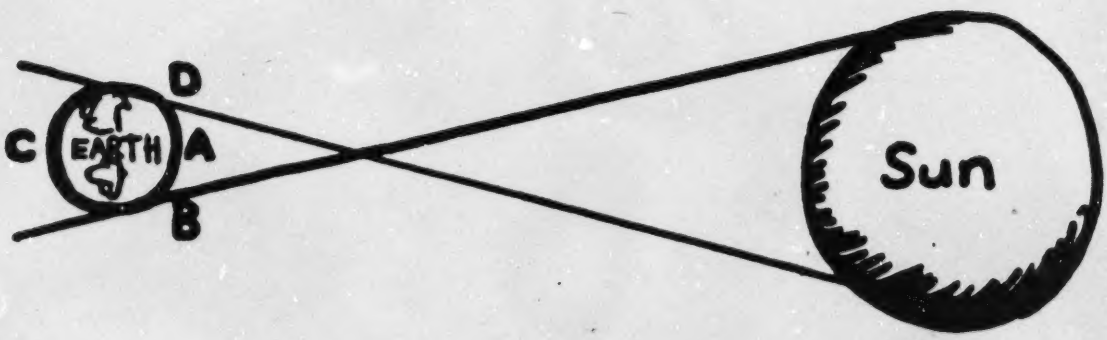
Draw a picture of yourself as an astronomer. Then write a paragraph telling why you decided to become an astronomer.

TASK CARD 9

MAKE A DIAGRAM OF DAY AND NIGHT

You need:

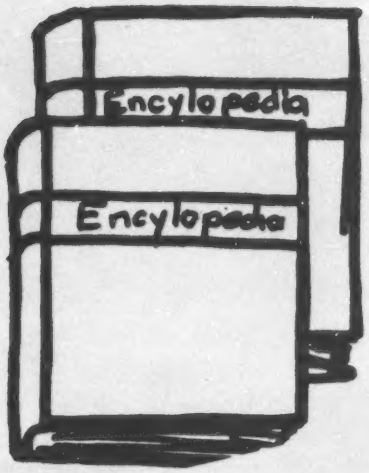
1. manila paper
2. felt pens



Draw a diagram of the sun shining on the earth.

Tell what time it would be at the points A, B, C, and D.

TASK CARD 10



OUR STAR - THE SUN

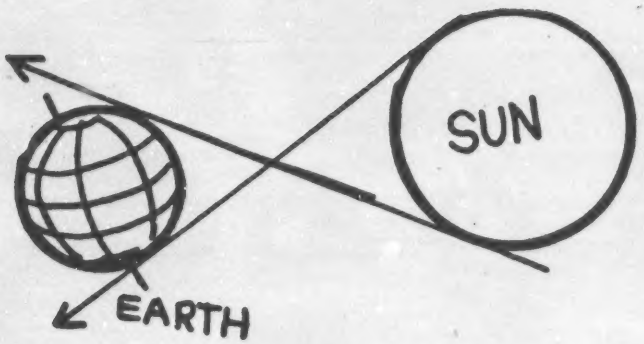
You need:

1. encyclopedia or reference book
2. paper
3. pencil

Write a report on the sun. Be sure to include all the facts you can and why the sun is important to the earth.

What do you think might happen to the earth if our star, the sun, died?

TASK CARD 11



DEMONSTRATE DAY AND NIGHT

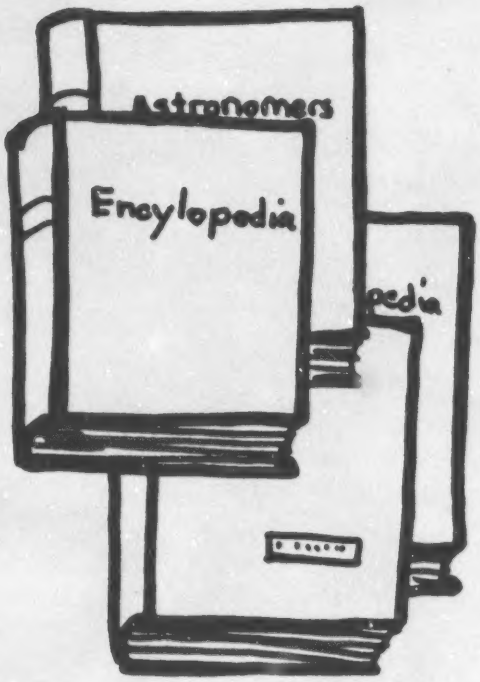
You need:

1. a globe and lamp
2. two people
3. small clay figure (clay will stick to the globe)

Place the clay figure on the globe and shine the lamp on the globe and turn the globe slowly. Your figure should come into the light (morning), face the light (noon), go away from the light (afternoon). What time would it be when the figure is on the opposite side of the globe from the light?

Practice so you can explain it to the class.

TASK CARD 12

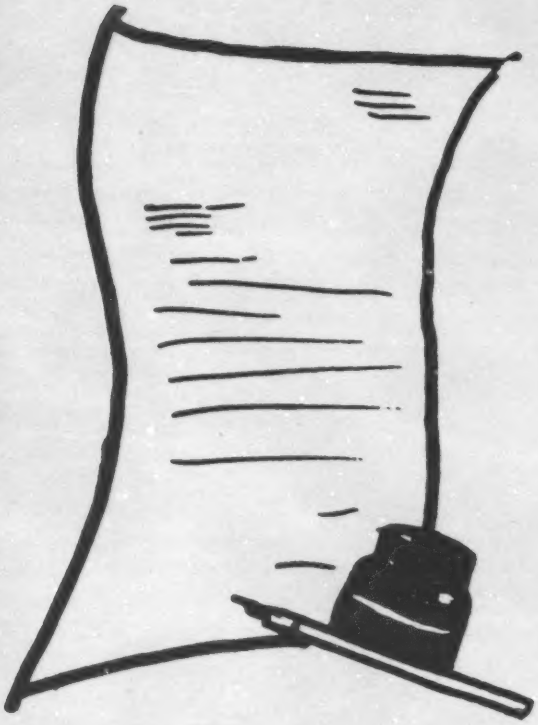


WORDS FOR THE ASTRONOMER

You need:

1. paper
2. pencil
3. a book or encyclopedia on Astronomers

Look through the book you have selected on Astronomers. Make a list of all the words and terminology used in this occupation.



TASK CARD 13

WRITE FOR INFORMATION . . . . .

You need:

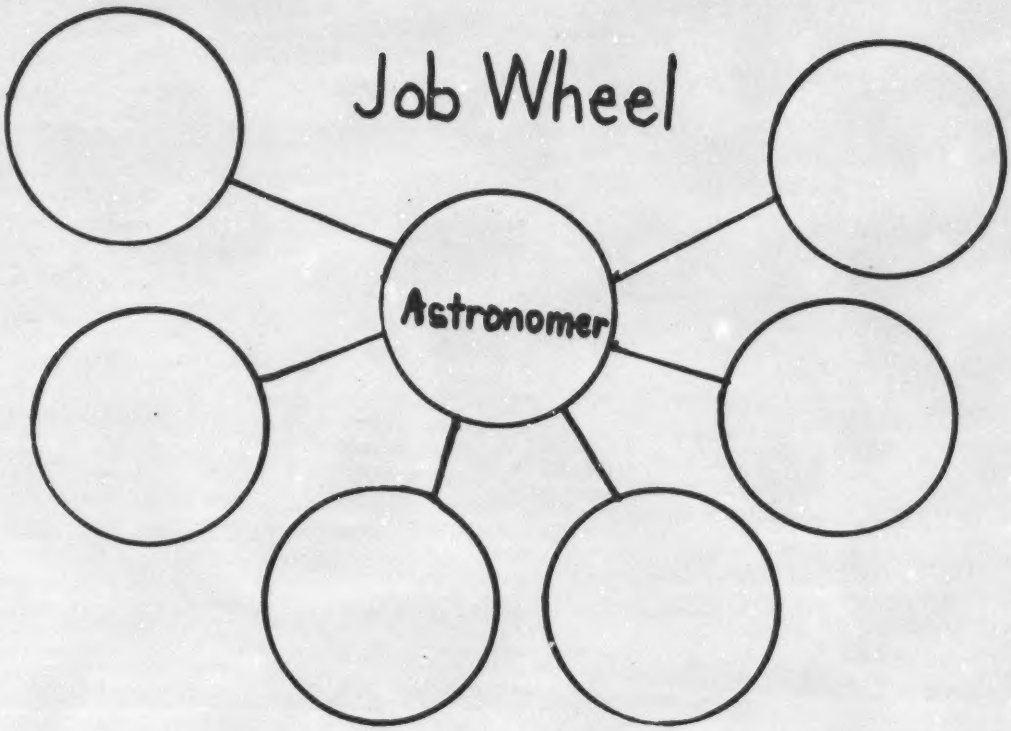
1. paper
2. pencil
3. envelope
4. stamp

Write a letter to the American Astronomical Society and tell them you are studying about a career in astronomy. Ask them to send you the pamphlets: Guidelines in Employment Opportunities in Astronomy and A Career in Astronomy.

Write to: American Astronomical Society
Executive Officer
211 FitzRandolph Road
Princeton, New Jersey 08540

Note to the teacher: It would be wasteful to have too many write for these pamphlets. Choose 2-4 students and have each write for one and then share them with the rest of the class.

TASK CARD 14



MAKE A JOB WHEEL

You need:

1. paper
2. pencil

Think of all the jobs that astronomers do. Make a wheel like the one above. Also explain the duties of each job under your wheel. Can you name six jobs?

TASK CARD 15

You need:

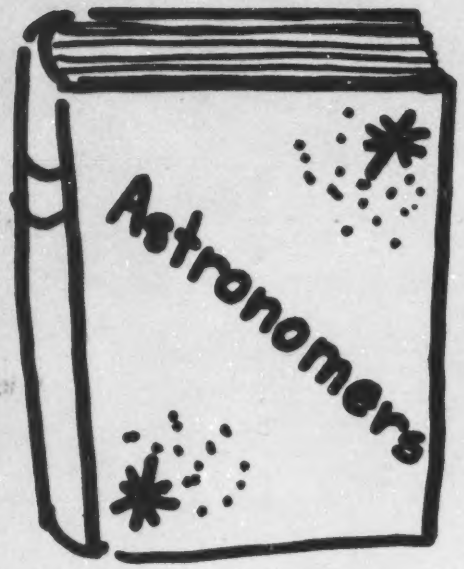
1. a piece of large poster paper
2. felt pens

PRETEND . . . . .

You are a job recruiter, looking for young men and women who would like to be astronomers.

Make a poster you can use when you visit a school.

You want your poster to have catchy words and appealing pictures.



TASK CARD 16

CAREER WORKSHEET

You need:

1. pencil
2. a copy of this task card
3. a reference book
   (from school or public library)

OR

4. Ask your teacher for a copy of Information Sheet I

Name _____ Date _____

Astronomers

1. Do astronomers work mainly with people, ideas, or things?

   _____

2. What kind of training must you have to get the job? Check one.

   High school _____ Apprenticeship Training _____

   College _____ Trade School _____

3. Name 3 different things a person in the career must do in his/her work:

   A. _____

   B. _____

   C. _____

4. What is one advantage to a job like this for you?

   _____

5. What is one disadvantage to a job like this for you?

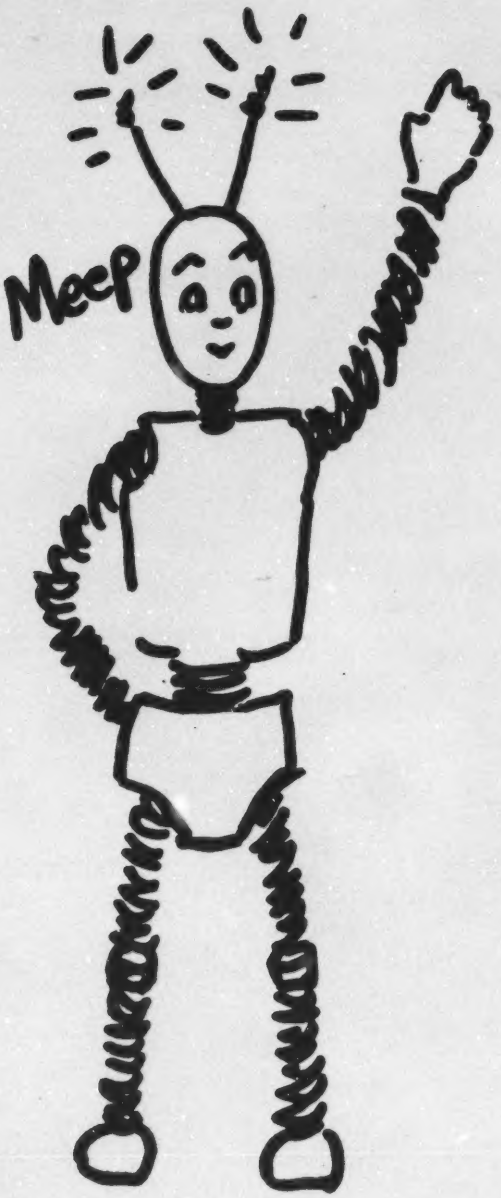
   _____

6. After studying this job, does it seem like something you might like to do some day?

   _____

   _____

TASK CARD 17



BE A NEWSPAPER REPORTER

You need:

1. a good imagination
2. manila paper
3. felt pens

PRETEND . . . . .

You are a reporter and have just interviewed an astronomer who had discovered life on Mars.

Make up a headline to tell your readers about this find. Then write a story to go with your headline. Be sure to tell your readers what the living thing was like and how it was discovered.

TASK CARD 18

FIRST WOMAN IN SPACE

OR

FIRST MAN IN SPACE

You need:

1. paper
2. pencil
3. manila paper
4. felt pens

Pretend you were the first explorer in outer space. Write an account of your adventure.

What did you discover?

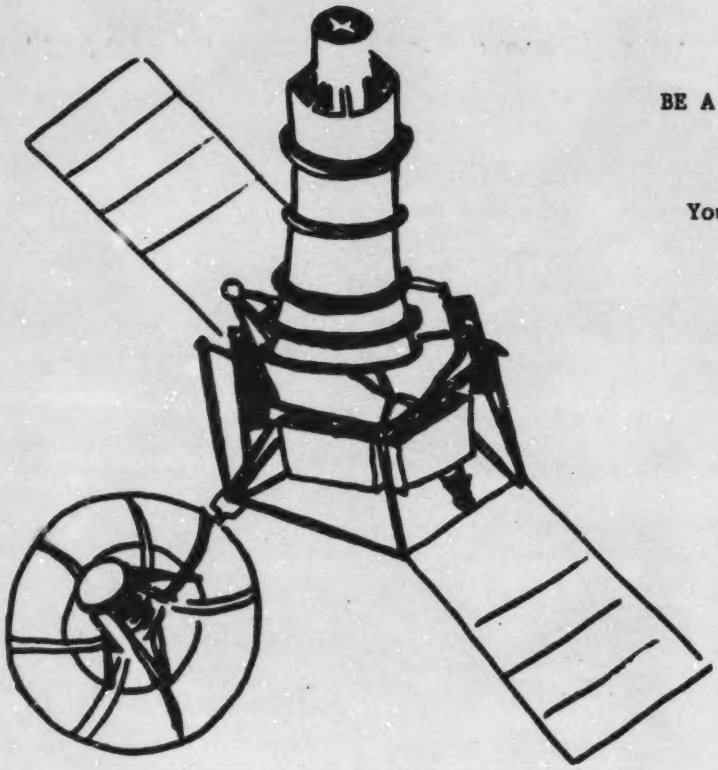
What did you see?

How did you feel?

Why did you go?

Draw a picture to go with your story.

TASK CARD 19



BE A SPACE SCIENTIST

You need:

1. manila paper
2. felt pens

You are in charge of sending a satellite probe into space to gather information.

Where will you send it?

What do you want to find out?

What instruments will you put in the satellite?

Draw a picture of your satellite and answer the questions on the back of the drawing or attach a piece of paper to the front of the picture.

TASK CARD 20

THIS IS MY LIFE

You need:

1. people to help you
2. skill as an actor/actress.

Create your own television skit about your work as an astronomer.

You might include:

1. Astronomer as a teacher.
2. Astronomer as an investigator.
3. Astronomer working in laboratories and planetariums.
4. Astronomers making new discoveries.
5. Astronomers and experiments such as: study of moon rocks, solar particles and meteorites.
6. Astronomer collecting radio waves.
7. Astronomer experimenting with X-rays and radiation.

Share your skit with the class.

FOREWORD

Project CHOICE: Children Have Options in Career Education, is an Exemplary Project from the San Diego City School District, which has been adapted, with ESEA Title IV-C funding, for Kern County Schools.

Through Project CHOICE, units have been developed to provide the classroom teacher with a source of career-related activities linking classroom experiences with the world of work. All students, regardless of their post-high school plans, share an equal need for career awareness, decision making skills, and other elements of career education. This goal can be accomplished if all teachers and counselors "fit" the appropriate units where they best apply in the curriculum.

We are indebted to the San Diego City School District, and the Project CHOICE staff, for developing and field testing the original units.

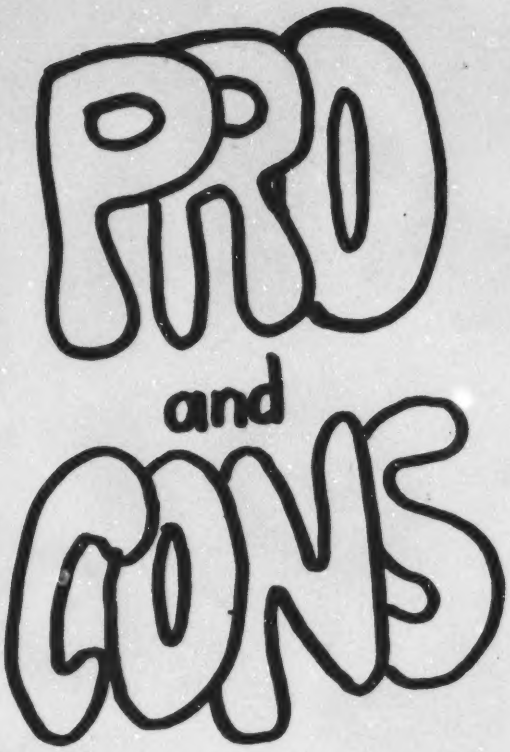
For their excellent work in re-writing the units in order to adapt them for use in Kern County Schools, we wish to recognize:

Patricia Alexander
Kernville Union School District
Robin Cole
Standard School District
Carol Hatcher
Beardsley School District
James Murphy
Greenfield Union School District
Dan Sawyer
Tehachapi Unified School District
Sharon Shires
Rio Bravo - Greely Union School District
Cynthia Silliman
Richland School District

Janet S Wells

Janet Wells
Career Education Resource Teacher
Guidance Services

TASK CARD 21



You need:

1. note cards
2. pencil
3. a friend to work with you

Imagine that the job of Astronomer is being phased out of society. With a friend think about all the PROS and CONS on whether this job should be phased out. Make a list of PROS and CONS. Share your ideas with the class. Hold a vote to determine if the job will be abolished.